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10/725,021	12/02/2003	Sang-Woo Kim	DPO-0008	4730

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KED & ASSOCIATES, LLP
2325 DULLES CORNER BLVD.
SUITE 1100
HERNDON, VA 20171

EXAMINER	
BOATENG, ALEXIS ASIEDUA	
ART UNIT	PAPER NUMBER
2838	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/725,021	KIM ET AL.	
	Examiner	Art Unit	
	Alexis Boateng	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,8-10,14,16-25,27,29 and 32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-10,14,16-25,27,29 and 32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 8 - 10 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Landon (U.S. 6,198,251).

Regarding claim 1, Landon discloses a method of charging a plurality of batteries comprising: controlling charging each of a plurality of batteries (figure 1 item 40: duty cycle monitor controls charging), wherein the each of the plurality of batteries is charged alternatively and wherein the alternative charging is based on satisfying at least one of a charging voltage of each of the plurality of batteries being greater than a reference voltage and a reference voltage and a charging current of each of the plurality of batteries being less than a limit current (column 4 lines 3 – 22: batteries are charged in sequence and the reference voltages are the percentages that it is charged to and when the charging current has reached a certain level);

charging a first battery with a constant current until a voltage of said first battery becomes greater than a reference voltage (column 4 lines 13 – 22);

charging a second battery with a constant current until a voltage of said second battery becomes greater than a reference voltage (column 4 lines 13 – 22);

resuming charging of said first battery until the charging current is less than a limit current indicating a state of full charge (column 4 lines 13 – 22);

resuming charging of said second battery until the charging current is less than a limit current indicating a state of full charge (column 4 lines 13 – 22).

Regarding claim 8, Landon discloses wherein charging a first battery with a constant current until a voltage of said first battery becomes greater than a reference voltage (column 4 lines 13 – 22);

charging a second battery with a constant current until a voltage of said second battery becomes greater than a reference voltage (column 4 lines 13 – 22);

resuming charging of said first battery until the charging current is less than a limit current indicating a state of full charge (column 4 lines 13 – 22);

resuming charging of said second battery until the charging current is less than a limit current indicating a state of full charge (column 4 lines 13 – 22).

Regarding claims 9 and 10, Landon discloses wherein resuming charging of the second battery until a charging current of the third battery is les than a reference current (column 4 lines 13 – 22: charging is resumed on batteries to be charged to a certain percentage of charging voltage, which in turn equates to stopping at a certain charging current, which is less than a full charge).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2- 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landon (U.S. 6,198,251).

Regarding claims 2 – 4, Landon discloses column 4 lines 13 - 21 wherein said reference voltage is between approximately 70% and 80% of a full charge, said reference current is a current value at a time of approximately 80% of a full charging voltage, and said limit current is a current value at a time of approximately 95% of a full charging voltage. Landon discloses wherein the batteries are charged 10% which equates to be 10% of the reference voltage, charging voltage and 90% of the limiting current. Landon does not disclose wherein these values are 70%-80%, 80% and 90%, respectively. It would have been obvious to a person of ordinary skill to modify the Landon system with 70%, 80% and 90% limitation values so that only a portion of the batteries are charged to increase charging efficiency. Since it has been held that there where the general conditions of a claim are disclosed in the prior art, discovering an optimum value of a result effective variable involves only routine skill in the art. In re Bosch, 617 F.2d 272, 205 USPQ 214 (CCPA 1980).

5. Claims 14 – 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Odehara (U.S. 2001/0005124) in view of Landon (U.S. 6,198,251) and Tamai (U.S. 5,637,979) in the alternative.

Regarding claim 14, Odehara discloses a method of charging a plurality of batteries comprising: identifying a charging voltage/current characteristic at least one of plurality of batteries (paragraph [0028] – [0029]) controlling charging each of a plurality of batteries according to a charging voltage/current characteristic of each of the plurality of batteries (paragraph [0034] and paragraph [0027]- [0029]), wherein the each of the plurality of batteries is charged alternatively and wherein the alternative charging is based on satisfying at least one of a charging voltage of each of the plurality of batteries being greater than a reference voltage and a reference voltage and a charging current of each of the plurality of batteries being less than a limit current (paragraph [0027] – [0029]);

charging a first battery with a constant current until a voltage of said first battery becomes greater than a reference voltage (paragraph [0027] – [0029]);

charging a second battery with a constant current until a voltage of said second battery becomes greater than a reference voltage (paragraph [0027] – [0029]);

stopping charging of said first battery and the second battery until the charging current is less than a limit current indicating a state of full charge (paragraph [0027] – [0029]); completing charging of the first and the second battery until the charging current is less than a limit current indicating a state of

full charge (paragraph [0027] – [0029]). Landon discloses wherein said charging voltage/current characteristic has one of a voltage gradient and a current gradient according to a charging voltage/current of each of the plurality of batteries in paragraphs [0027] and 92. In the alternative, Tamai discloses in figure 9 a graph showing voltage and current characteristics having a voltage and current gradient according to the charging of the first battery. At the time of invention, it would have been obvious to a person of ordinary skill in the art to find the voltage and current gradient because it provides important information about the battery's performance.

Regarding claim 16, Odehara does not disclose wherein said voltage of said first battery gradually rises, said current goes to a constant current then said current gradient goes to substantially zero, thereby said voltage of said first battery having a predetermined gradient, and wherein when said first battery is charged by some degree of charging, said current drops, said current gradient has a negative value, and then said first battery has a constant voltage zone, thereby said voltage of said voltage being substantially zero. Tamai discloses in figure 9 a graph showing wherein the voltage gradually rises, the current goes to a constant current and then the current gradient goes to substantially zero, thereby said voltage of said first battery having a predetermined gradient and wherein when said first battery is charged by some degree of charging, said current drops, said current gradient has a negative value, and then said first battery has a constant voltage zone, thereby said voltage of said voltage being

substantially zero. At the time of invention, it would have been obvious for the Odehara charging system to implement Tamai's system because it provides accurate information of the rates of charging the battery, which is necessary to optimize charging performance.

Regarding claims 17 – 18, Odehara does not disclose the method wherein said first charging voltage/current characteristic, said voltage gradient is more than zero and a charging voltage has a reference of approximately 4.0 V and wherein a charging current has references of approximately 100mA and approximately 200mA. Tamai discloses in figure 9 wherein said first charging voltage/current characteristic, said voltage gradient is more than zero, which shows that there is an increase in charging, but does not disclose wherein a charging voltage has a reference of approximately 4.0 V and wherein a charging current has references of approximately 100mA and approximately 200mA. At the time of invention, it would have been obvious to a person of ordinary skill in the art to have the voltage gradient to be more that zero so that the voltage rate of charge increases, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

Regarding claim 19, Odehara does not disclose wherein said first battery charging said voltage gradient of said first battery is not more than zero, and a charging voltage of said first battery is not more than approximately 4.0V, and wherein if said voltage gradient is not more than zero and said charging current

is more than approximately 100mA and not less than approximately 200mA, then said first battery is charged and said second battery is not charged. Tamai discloses in figure 9 wherein said first battery charging said voltage gradient of said first battery is not more than zero, which shows that there is an increase in charging, but does not disclose wherein a charging voltage of said first battery is not more than approximately 4.0V, and wherein if said voltage gradient is not more than zero and said charging current is not more than approximately 100mA and not less than approximately 200mA. At the time of invention, it would have been obvious to a person of ordinary skill in the art to have the voltage gradient to be more that zero so that the voltage rate of charge increases, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

Regarding claims 20 – 23, Odehara does not disclose the wherein said second battery charging, said voltage gradient of said second battery is more than zero, and a charging voltage of said second battery is not more than approximately 4.0V; and wherein if said voltage gradient is not more than zero and said charging current is more than approximately 100mA and not less than approximately 200mA, then said secondary battery is charged and said first battery is not charged. Tamai discloses in figure 9 wherein said second battery charging, said voltage gradient of said second battery is more than zero, which shows that there is an increase in charging, but does not disclose a charging

voltage of said second battery is not more than approximately 4.0V; and wherein if said voltage gradient is not more than zero and said charging current is not more than approximately 100mA and not less than approximately 200mA, then said secondary battery is charged and said first battery is not charged. At the time of invention, it would have been obvious to a person of ordinary skill in the art to have the voltage gradient to be more that zero so that the voltage rate of charge increases, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

Regarding claim 24, Odehara does not disclose wherein in said first battery charging, a voltage and a current are an initial rising voltage and an initial constant current applied to said first battery, respectively. Tamai discloses in figure 9 wherein the applied charge to the first battery is an initial rising voltage and an initial constant current, so that an overcharge of current is prevented and the voltage is regulated to a certain level. At the time of invention, it would have been obvious to a person of ordinary skill in the art to implement the first battery's charging as a rising voltage and a constant current so that an overcharge of current is prevented and a simpler method regulating the voltage is provided.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Odehara (U.S. 2001/0005124) in view of Landon (U.S. 6,198,251).

Regarding claim 25, Odehara discloses wherein a first circuit to apply at least one of a constant voltage or constant current to first battery (figure 4 shows

wherein the first battery is charged by its own circuit via sw1; paragraph [0023] shows wherein the batteries are charged with constant voltage and constant current);

a second circuit to apply at least one of constant voltage or constant current to a second battery (figure 4 shows wherein the first battery is charged by its own circuit via sw2; paragraph [0023] shows wherein the batteries are charged with constant voltage and constant current); and

a control circuit to control operations of the first circuit and the second circuit such that the first battery and the second battery are alternatively charged or stop charging according to charging voltage/current characteristics of the first battery and the second battery (figure 4 item 82 controls charging).

Odeohara discloses the invention as previously claimed, but does not disclose the remainder. Landon discloses wherein the alternative charging is based on satisfying at least one of a charging voltage of each of the plurality of batteries being greater than a reference voltage and a reference voltage and a charging current of each of the plurality of batteries being less than a limit current (column 4 lines 3 – 22: batteries are charged in sequence and the reference voltages are the percentages that it is charged to and when the charging current has reached a certain level). Landon further discloses charging a first battery with a constant current until a voltage of said first battery becomes greater than a reference voltage (column 4 lines 13 – 22). Landon also disclose charging a second battery with a constant current until a voltage of said second battery

becomes greater than a reference voltage (column 4 lines 13 – 22). Landon discloses wherein the distributor, figure 1 item 50 acts as a charge control circuit and resumes charging on the first and second batteries based upon their charging current. At the time of invention, it would have been obvious to a person of ordinary skill in the art to modify the Odeohara system with the Landon system so that the gasses are allowed ample time to recombine the solution within the batteries to provide enhanced battery performance and lessen charge time.

Regarding claims 27 and 29, Odehara discloses wherein the charging voltage/current characteristics relate to a reference voltage and a reference current and wherein the reference voltage and current is approximately 70% - 80% of a full charge voltage (paragraph [0023]).

Response to Arguments

7. Applicant's arguments filed 12/27/06 have been fully considered but they are not persuasive. **Regarding claim 1,** the applicant argues the Landon reference does not disclose charging each of the plurality of batteries where the alternative charging is based on satisfying a charging voltage of each of the plurality of batteries being greater than a reference voltage and a charging current of each plurality of batteries being less than a limit current. Landon discloses in column 3 lines 40 – 67 wherein the battery is charged based off of voltage parameters. In addition, the batteries are charged to 10%

during each cycle, which this 10% is a reference voltage and limit current, as disclosed in column 3 lines 26 – 39 wherein voltage and current is provided to the batteries. The applicant further argues that the Landon reference does not disclose or suggest resuming charging of a first battery, or a second battery until the charging current is less than a limit current indicating a state of full charge. The Landon system charges the batteries sequentially, therefore, the charge is resumed in the first battery at the end of a first cycle, wherein the batteries have been charged less than the limit current, which is less than full charge.

8. **Regarding claim 25 – 29,** the applicant argues that Odeohara does not disclose or suggest wherein alternate charging being based on satisfying charging voltage/current characteristics related to a reference voltage and a charging current being less than a reference current. Odeohara discloses in paragraph [0023] wherein the batteries are charged with constant voltage and constant current. The applicant further argues wherein the Odeohara reference does not charge the batteries in the alternative. Odeohara discloses in paragraph [0027] – [0029] wherein the batteries are charged in sequence until a predetermined amount reached, which is a reference current. The applicant further argues that the Odeohara reference does not disclose resuming charging of a first battery until the charging of a first battery until the charging current is less than the reference curren and controlling resuming charging of the second battery until the charging current is less than the reference current. The applicant discloses 'or' in the claims, so it is not required that the Odeohara reference perform this function, but the rejection has been modified with the Landon reference.

9. **Regarding claims 2 – 4,** please see arguments above.

10. **Regarding claims 14 – 24,** the applicant argues that the references do not disclose completing charging of one of the first battery and the second battery based on the charging voltage/current characteristic of the one of the first battery and the second battery, the charging voltage/current characteristic being related to a reference current, the completing the charging comprising resuming charging of one of the first battery and the second battery until a charging current is less than the reference current. Please see arguments above.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexis Boateng whose telephone number is (571) 272-5979. The examiner can normally be reached on 8:30 am - 6:00 pm, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on (571) 272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AB

KARL EASTHOM
SUPERVISORY PATENT EXAMINER